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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/534,877

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Armin Schwerdtner

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EXAMINER

CHANG, AUDREY Y

ART UNIT

PAPER NUMBER

2872

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

9/14

Office Action Summary	Application No.	Applicant(s)	
	10/534,877	SCHWERDTNER, ARMIN	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on April 30, 2007, which has been entered into the file.
- By this amendment, the applicant has canceled claims 1-10 and has newly added claims 11-50.
- Claims 11-50 remain pending in this application.

Response to Amendment

1. The amendment filed on **April 30, 2007** is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the newly added claims 11, 41 and 49 recite the phrase of "virtual observer window" that is not supported by the specification. The newly added phrase "the pitch of the spatial light modulator determining the maximum size of the virtual observer window and not the maximum size of the holographic reconstruction" is not supported by the specification. The newly added phrase "a computational unit controlling the spatial light modulator ... so that the wavefront is associated with a virtual observer window ..." recited in claim 41 and the newly added phrase "the computational unit is operable to limit the size of the virtual observer window to be no larger than a single diffraction order..." are not supported by the specification. The specification only discloses that the hologram is a computer generated hologram but not with such details. The newly added phrase "a computational unit adapted to control the way in which a hologram is encoded on a spatial light modulator ..." recited in newly added claim 49 is not supported by the specification.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 11-50 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejections based on the newly added matters are set forth in the paragraphs above.

4. **Claims 11-50 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification fails to provide the enablement of creating “virtual observer window”.

The specification fails to provide the enablement of Fresnel transformation of the hologram and not the Fourier transformation of the hologram as recited in the newly added claim 16.

The specification fails to disclose how the image plane of the light source is generated. A spatial light modulator will not generate an image plane.

The specification fails to disclose how does the virtual light source is generated.

The specification fails to disclose how the light source is being positioned by the mechanical or electronic displacement or by movable mirrors.

The specification fails to disclose how does the computational unit is capable of limiting the size of the virtual observer window.

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5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. **Claim 50 is rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 50 is dependent from a canceled claim which makes the scopes of the claims confused and indefinite.

Claim Objections

7. Claims 1-50 are objected to because of the following informalities:

(1). It is not clear where does the image plane of the light source come from. It is not clear what is considered to be the maximum size of the hologram reconstruction. Does this mean the hologram is only be reconstructed within a single window related to a single pitch of the spatial light modulator?

(2). How does the “reconstruction volume” is being defined here?

(3). What is considered to be “the region (a)” of claim 13? What is considered to be “(b) is the only region in the hologram encoded”?

(4). The phrase “the region” recited in claim 14 is confusing since it is not clear what is this region.

(5). Claims 16 and 17 seem to be contradicting to each other. The claims fail to provide the criterions for allowing Fourier transformation and not allowing Fourier transformation.

(6). The phrase “the virtual observer window is smaller than that spatial light modulator” recited in claim 19 is confusing since it is not clear if this is referred to the total size of the spatial light modulator or the pitch of the modulator?

(7). The phrase “and/or” recited in claim 35 is confusing and indefinite.

(8). The scope of claim 50 is not definite.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. **Claim 49 is rejected under 35 U.S.C. 102(e) as being anticipated by the US Patent**

Application Publication (US 2004/0263930 A1) by Payne.

Payne teaches a method and an apparatus for illuminating a *computer generated hologram* wherein a *computer* that serves as the computational unit is used to compute the computer generated hologram. Payne teaches that the computer generated hologram is displayed on a *spatial light modulator* (1, Figure 1), this implies that the computer or the computational unit is used to *control the way the hologram is being encoded on the spatial light modulator*. Payne teaches that a light source (2) and an optical system (3) are used to illuminate the hologram (3). A wavefront will certainly be generated from the illumination of the hologram and implicitly that an observer can view the reconstruction of the hologram through a viewing window determines by the size of the spatial light modulator at the image plane of the light source through the optical system.

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 11-48 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over the US Patent Application Publication (US 2004/0263930 A1) by Payne.

Payne teaches a method and an apparatus for illuminating a *computer generated hologram* wherein a *computer* that serves as the *computational unit* is used to compute the computer generated hologram. Payne teaches that the computer generated hologram is displayed on a *spatial light modulator* (1, Figure 1), this implies that the computer or the computational unit is used to *control the way the hologram is being encoded on the spatial light modulator.*, and a method step for controlling the spatial light modulator for displaying the hologram is included. Payne teaches that a light source (2) and an optical system (3) are used to illuminate the hologram (3). A wavefront will certainly be generated from the illumination of the hologram and implicitly that an observer can view the reconstruction of the hologram through a viewing window determines by the size of the spatial light modulator at the image plane of the light source through the optical system.

This reference has met all the limitations of the claims. A spatial light modulator implicitly has matrix of pixels or openings and the pitch of these pixels or openings define a window or aperture for viewing. The maximum size of the window is therefore defined by the pitch of the pixels or openings. This reference however does not teach explicitly to have the viewing window not larger than a single diffraction order or the pitch of the spatial light modulator pixels not determining the maximum size of the holographic reconstruction. However this feature is either inherently met or an obvious modification to one skilled in the art, different diffraction orders of diffracted light are commonly spatially separated and to have the viewing window not larger than the single diffraction order would reduce the cross talks between different diffraction orders of light.

The reconstruction of the hologram is within the reconstruction volume spanned by the spatial light modulator.

With regard to claims 13-14, it is implicitly true that the holographic reconstruction is made up of multiple discrete points and each of the point is related to the region of the spatial light modulator encoded with information for reconstructing that point.

With regard to claims 16-17, Payne teaches that the light source and the optical system is arranged to provide Fourier transformation for the light source. This means an inverse Fourier transformation of the hologram is generated at the image plane of the light source. However this reference does not disclose for providing Fresnel transformation. But since the claims also fail to disclose the arrangement for achieving such this feature therefore cannot be examined here.

With regard to claims 22, 31 and 42, this reference does not teach tracking the eye of an observer, however eye tracking sensor is well known in the art for detecting the eye position of an observer for allowing the light illumination and therefore the display of an image be accommodate with the movement of the observer.

With regard to claims 26-29, Payne teaches that the light source may include individual real point light source, line light source, a plurality of point light sources, (please see Figures 1-6). However this reference does not teach explicitly that the light source is virtual light source. But since the specification fails to disclose the criticality of the light source being virtual as compared to being real light source, such modification is considered to be obvious matters of design choice to one skilled in the art for the benefit of using available light source as desired.

With regard to claim 30, this reference does not teach explicitly of positioning the light sources by the claimed means. However it is known in the art that a light source can be positioned by mechanical means as needed.

With regard to claims 35-40 and 43-45, Payne teaches that the spatial light modulator is used to display the computer generated hologram this means the spatial light modulator can control the phase and the amplitude. This reference does not teach explicitly of reproducing color hologram. However a

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standard spatial light modulator can display color image with three primary color sub-pixels as one single pixel. It would have been obvious to one skilled in the art to make the display a color holographic display. This reference also does not teach that the spatial light modulator is a TFT flat screen. But since TFT flat screen is one known type of spatial light modulator such modification would have been obvious to one skilled in the art to use commercial available modulator for the display.

With regard to the features of intended uses of the display as gaming device, medical image display device or military information display device, such modifications are considered obvious to one skilled in the art for the benefit of achieving the desired the application functions.

Claim 50 is being regard as depended from claim 11 and it is implicitly met by the disclosure of Payne.

Response to Arguments

12. Applicant's arguments with respect to newly added claims 11-50 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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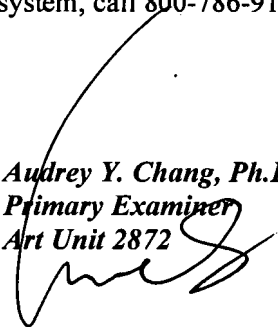
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872



A. Chang, Ph.D.